CAPA801 Series

Intel® Atom™ Processor

Capa Board with LVDS

User's Manual

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

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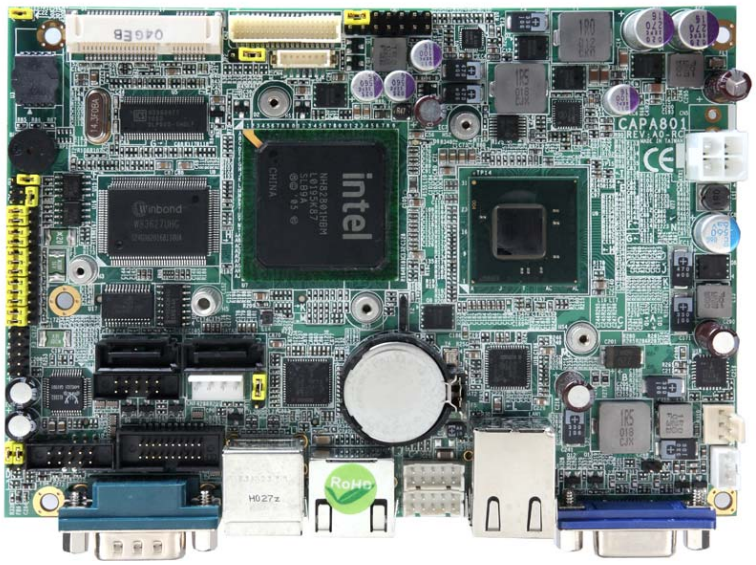
CHAPTER 1
INTRODUCTION



The **CAPA801**, a Capa board, supports Intel® Atom™ processor N455/D425/D525. The board integrates chipset ICH8M that delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions. There is one 204-pin unbuffered SO-DIMM socket for singe channel DDR3-667/800 MHz memory, maximum memory capacity up to 4GB. (N455 is only for DDR3-667, maximum memory capacity up to 2GB). It also features two Gigabit/Fast Ethernet, two serial ATA channels for total two Serial ATA hard drives at maximum transfer rate up to 150/300MB/sec, six USB 2.0 high speed compliant, built-in HD audio codec that can achieve the best stability and reliability for industrial applications. Additionally, it provides you with unique embedded features, such as 4 serial ports and 3.5" form factor that applies an extensive array of PC peripherals.

1.1 Specifications

- **CPU**
  - **Intel® Atom™ processor N455/D425/D525**
- **System Chipset**
  - **Intel® ICH8M**
- **BIOS**
  - American Megatrends Inc. BIOS.
  - 8Mbit SPI Flash, DMI, Plug and Play
  - RPL/PXE Ethernet Boot ROM
  - "CMOS Backup Function" to backup customized Setting in the BIOS flash chip to prevent from CMOS battery fail
- **System Memory**
  - One 204-pin unbuffered DDR3 SO-DIMM sockets with Raw Card-A or Raw Card-B format
  - Maximum to 4GB DDR3 667/800 MHz memory for D425/D525
  - Maximum to 2GB DDR3 667 MHz memory for N455

Support DDR3 SO-DIMM Module Configurations for each SO-DIMM

DIMM Capacity	DRAM Organization	# of Device
1GB	64Mb x 16	8
1GB	128Mb x 8	8
2GB	128Mb x 16	8
2GB	256Mb x 8	8
4GB	256Mb x 16	8
4GB	512Mb x 8	8

Note:

1. Raw Card-A = 2Ranks of x16 SDRAMs
2. Raw Card-B = 1Rank of x8 SDRAMs

- **Onboard Multi I/O**
  - Controller: Winbond W83627UHG
  - Serial Ports: One port for RS-232/422/485 and three ports for RS-232

- Two SATA-150/300 connectors

- **CompactFlash™ Socket**
  - One CompactFlash™ Type II Socket
- **USB Interface**
  - Six USB ports with fuse protection and complies with USB Spec. Rev. 2.0
- **Display**
  - A slim type 15-pin D-Sub connector as VGA connector
  - One 40-pin connector for 18 bit single channel LVDS and one 7-pin inverter connector
  - Optional LVDS module, AX95601, for 24 bit dual channels LVDS
- **Watchdog Timer**
  - 1~255 seconds or minutes; up to 255 levels
- **Ethernet**
  - One port with INTEL 82567V for Gigabit/Fast Ethernet
  - One port with INTEL 82583V for Gigabit/Fast Ethernet
- **Audio**
  - HD Audio compliant (with Speaker/line-out & line/MIC-in) via Realtek ALC662
  - Speaker/line-out & MIC-in & Line-in via box header connector
- **Power Management**
  - ACPI (Advanced Configuration and Power Interface)
- **Form Factor**
  - 3.5" form factor

NOTE All specifications and images are subject to change without notice.

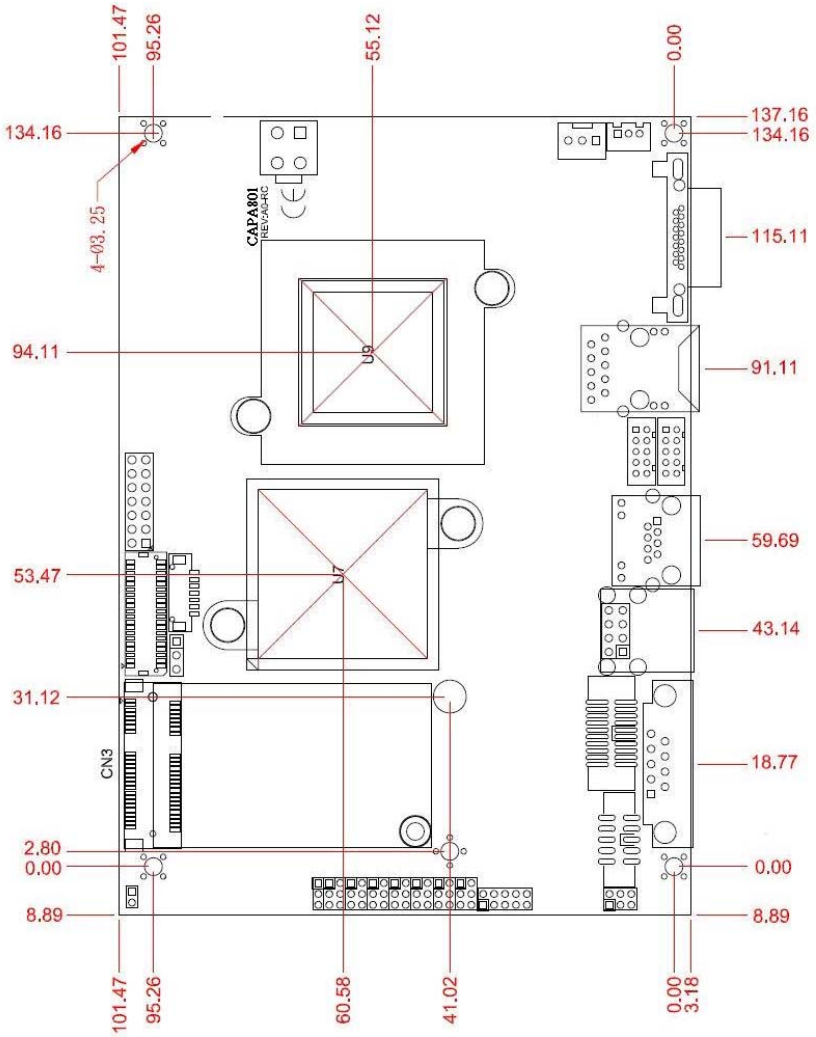
1.2 Utilities Supported

- Chipset Driver
- Ethernet Driver
  - INTEL 82567V
  - INTEL 82583V
- Graphic Driver
- Audio Driver
- AHCI Driver

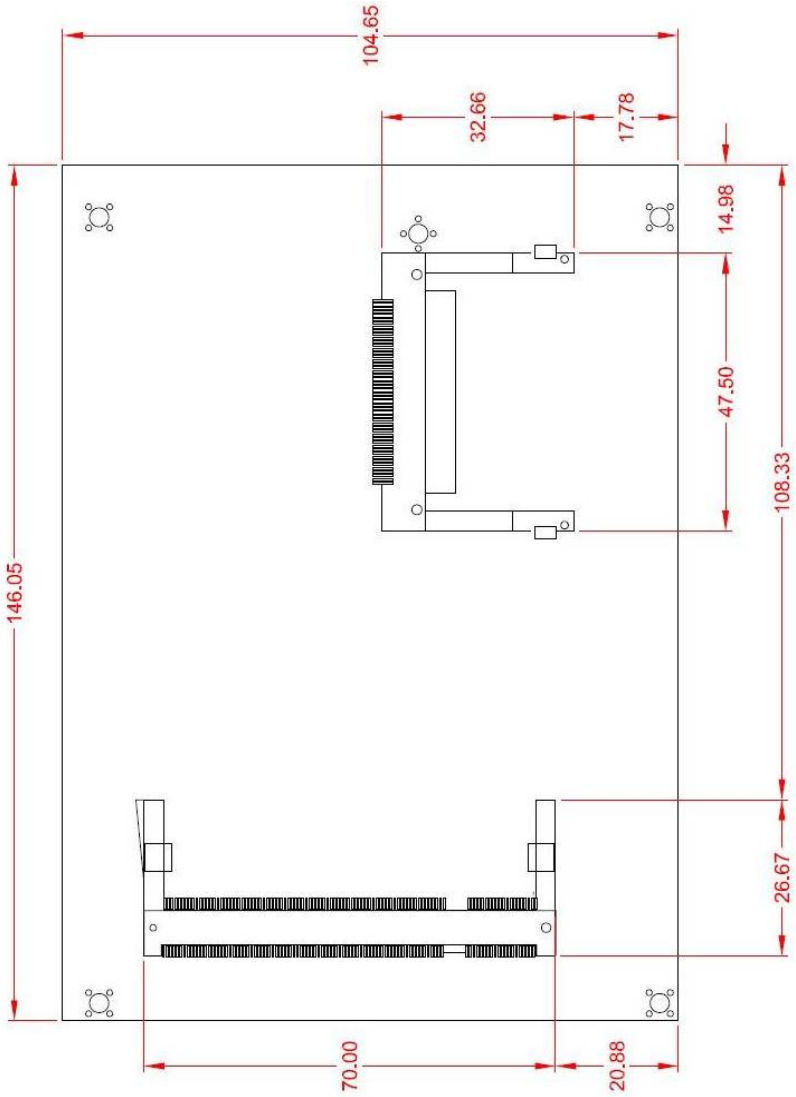
CHAPTER 2

JUMPERS AND CONNECTORS

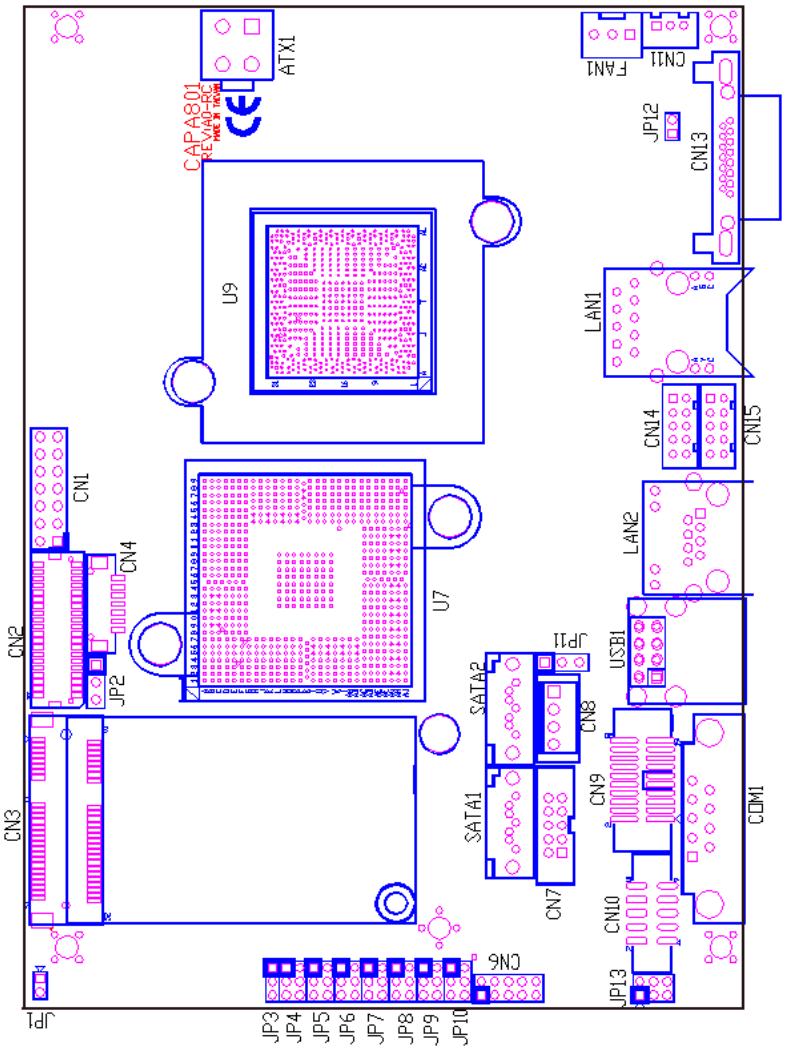
2.1 Board Dimensions and Fixing Holes



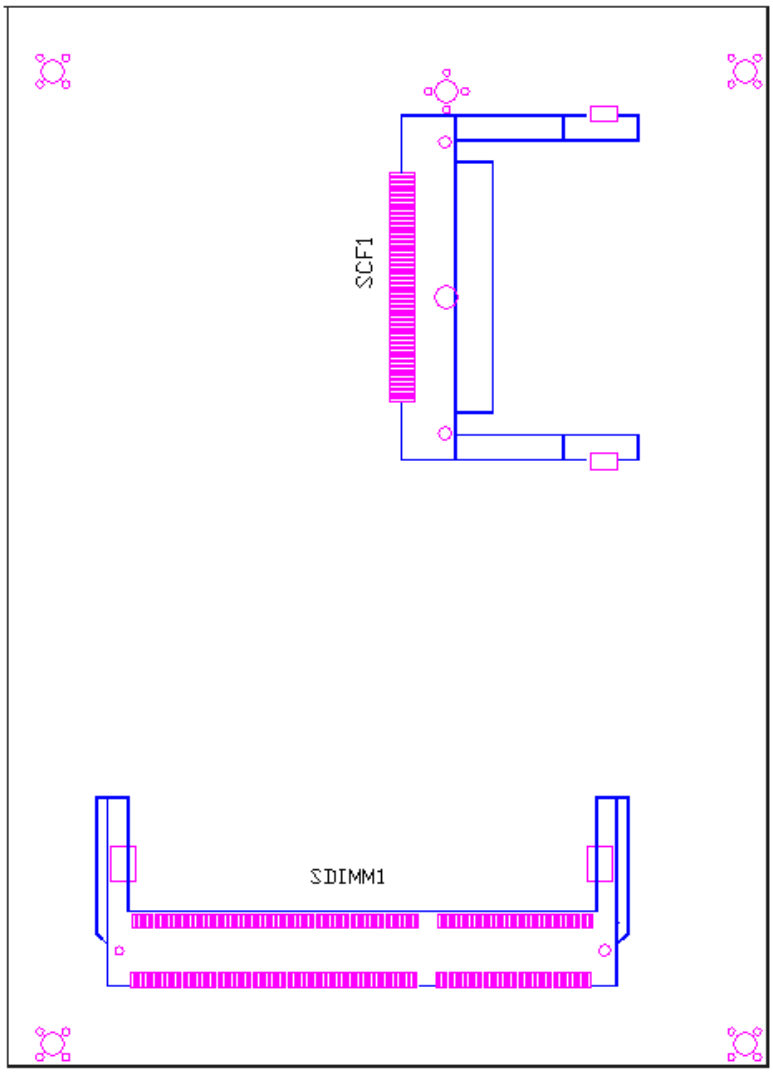
Component Side



2.2



Component Side



Solder Side

2.3 Jumper Settings

Proper jumer settings configure the **CAPA801** to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

Jumper	Function / Default Setting		Jumper Setting
JP1	Auto Power ON Default: Disable		Short
JP2	LVDS Voltage Selection Default: 3.3V		Short 1-2
JP3	Compact Flash Voltage Selection Default: 3.3V		Short 1-2
JP4	COM1 RS-232/422/485 Mode setting Default: RS-232		Short 1-2
JP5			Short 3-5、4-6
JP6			Short 3-5、4-6
JP7	COM4 Data/Power Select Default: RS-232 Data	CN9 Pin 11: DCD	Short 3-5
		CN9 Pin 18: RI	Short 4-6
JP8	COM3 Data/Power Select Default: RS-232 Data	CN9 Pin 1: DCD	Short 3-5
		CN9 Pin 8: RI	Short 4-6
JP9	COM2 Data/Power Select Default: RS-232 Data	CN7 Pin 1: DCD	Short 3-5
		CN7 Pin 8: RI	Short 4-6
JP10	COM1 Data/Power Select Default: RS-232 Data	COM1 Pin 1: DCD	Short 3-5
		COM1 Pin 9: RI	Short 4-6
JP11	Normal Operation/Clear CMOS setting Default: Normal Operation		Short 1-2
JP12	CRT Always On Jumper Default: Normal Operation On		Open
JP13	Audio Speak Out/Line Out Selection Default: Line Out		Short 1-3, 2-4

2.3.1 Auto Power On Jumper (JP1)

When Jumper JP1 is Enable for AC power input, the system will be automatically power ON without pressing soft power button; when JP1 is Disable for AC power input, it is necessary to manually press soft power button to make the system power ON.

Note *This function is similar to the feature of Power On after Power Failed, which is controlled by hardware circuitry instead of BIOS.*

Description	Function	Jumper Setting
Auto Power On	Disable (Default)	
	Enable	

2.3.2 LCD Voltage Slection Jumper (JP2)

The board supports +3.3V level or +5V level flat panel displays. This Jumper is used to set LVDS connector (CN2) PIN 1~6 VCCM, to be with voltage +3.3V level or +5V level.

Description	Function	Jumper Setting
LCD Voltage Selection	+3.3V level (Default)	
	+5V level	

2.3.3 CompactFlash™ Voltage Jumper (JP3)

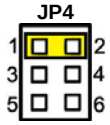
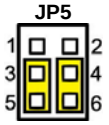
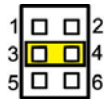
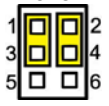
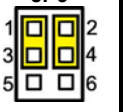
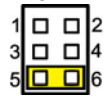
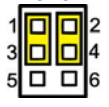
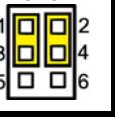
The jumper is to select the voltage for CompactFlash™ interface. It is used to set CF connector (SCF1) PIN 13 (VCC) & PIN 38 (VCC), to be with voltage 3V or 5V.

Description	Function	Jumper Setting
Compact Flash Voltage Selection	+3.3V level (Default)	
	+5V level	

2.3.4 COM1 RS-232/422/485 Mode Select Jumpers (JP4, JP5, JP6)

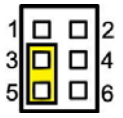
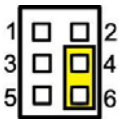
These jumpers select the communication mode of COM1 port to operate RS-232 or RS-422 or RS-485.

When these jumpers are selected to operate RS-422 or RS485, please make sure the COM1 is on Data mode. (See Section 2.3.8)

Description	Mode	Jumper Setting		
COM 1	RS-232 (Default)	JP4 	JP5 	JP6
	RS-422	JP4 	JP5 	JP6 
	RS-485	JP4 	JP5 	JP6 

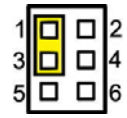
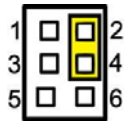
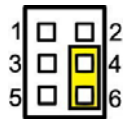
2.3.5 COM4 Data/Power Mode Selection Jumper (JP7)

The COM4 ports have +5V level power capability on DCD and +12V level power capability for RI, depending on the JP7 setting.

Description	Mode	Jumper Setting
COM4	Power; CN9 Pin 11 +5V level	
	Data; CN9 Pin 11 DCD (Default)	
	Powe;r CN9 Pin 18 +12V level	
	Data; CN9 Pin 18 RI (Default)	

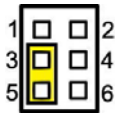
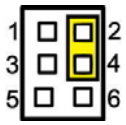
2.3.6 COM3 Data/Power Mode Selection Jumper (JP8)

The COM3 ports have +5V level power capability on DCD and +12V level power capability for RI, depending on the JP8 setting.

Description	Mode	Jumper Setting
COM3	Power; CN9 Pin 1 +5V level	
	Data; CN9 Pin 1 DCD (Default)	
	Powe;r CN9 Pin 8 +12V level	
	Data; CN9 Pin 8 RI (Default)	

2.3.7 COM2 Data/Power Mode Selection Jumper (JP9)

The COM2 ports have +5V level power capability on DCD and +12V level power capability for RI, depending on the JP9 setting.

Description	Mode	Jumper Setting
COM2	Power; CN7 Pin 11 +5V level	
	Data; CN7 Pin 11 DCD (Default)	
	Powe;r CN7 Pin 18 +12V level	
	Data; CN7 Pin 18 RI (Default)	

2.3.8 COM1 Data/Power Mode Selection Jumper (JP10)

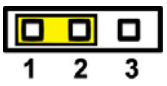
The COM1 ports have +5V level power capability on DCD and +12V level power capability for RI, depending on the JP10 setting.

When COM1 is set +5V level or +12V level, please make sure the Mode is RS-232 (See Section 2.3.4).

Description	Mode	Jumper Setting
COM1	Power; COM1 Pin 1: +5V level	
	Data; COM1 Pin 1: DCD (Default)	
	Power; COM1 Pin 9: +12V level	
	Data; COM1 Pin 9: RI (Default)	

2.3.9 CMOS Clear Jumper (JP11)

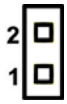
You may need to use this jumper is to clear the CMOS memory if incorrect settings in the Setup Utility.

Description	Function	Jumper Setting
CMOS Clear	Normal (Default)	
	Clear CMOS	

2.3.10 CRT Always On Jumper (JP12)

Once JP12 is set Enable, the CRT display is on no matter when the CRT cable plugs in.

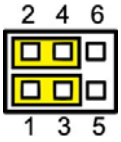
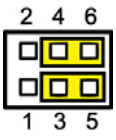
Once JP12 is set Disable, the CRT display may not be on when the CRT cable plugs in after booting.

Description	Function	Jumper Setting
CRT Always On	Disable	
	Enable (Default)	

2.3.11 Audio Output Jumper (JP13)

This jumper is to select which source for the audio output (CN10).

When the Speaker Out is set, it delivers 2W/channel continuous into 8 Ohm loads.

Description	Function	Jumper Setting
Audio Output	Line Out (Default)	
	Speaker Out	

2.4 Connectors

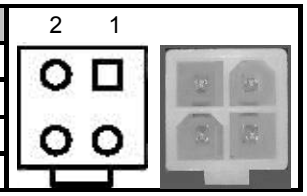
Connectors connect the board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Here is a summary table which shows you all connectors on the CAPA801 Series.

Connectors	Label
Power Connector	ATX1
Front Panel Connector	CN1
LVDS Connector	CN2
PCI-Express Mini Card Connector	CN3
Inverter Connector	CN4
2*5Pin DIO Connector	CN6
COM2 Connector	CN7
Power Output Connector	CN8
COM3, COM4 Connector	CN9
Audio Connector	CN10
SMBus Connector	CN11
VGA Connector	CN13
COM1 Connector	COM1
Serial ATA1 Connector	SATA1
Serial ATA2 Connector	SATA2
USB 2.0 Wafer	CN14
USB 2.0 Wafer	CN15
USB 2.0 Stack Port	USB1
CompactFlash Socket	SCF1
DDRIII SO-DIMM Connector	SDIMM1
Ethernet Connector 1	LAN1
Ethernet Connector 2	LAN2
CPU FAN Connector	FAN1

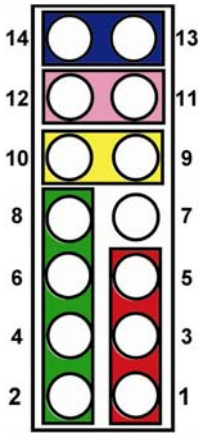
2.4.1 Power Connector Connector (ATX1)

This connector is satand ATX 4 pin 12V Power Connector. Connect it to the power supply ATX12V power.

Pin	Signal
1	GND
2	GND
3	+12V
4	+12V



2.4.2 Flat Panel Connector (CN1)



- **Power LED**

  Pin 1 connects Anode (+) of LED and either Pin 3 or Pin5 connects Cathode (-) of LED. The Power LED lights up when the system is powered ON.

- **External Speaker and Internal Buzzer Connector**

  Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the CPU card to an internal buzzer, please short pins 2,4; while connecting to an external speaker, you need to set pins 2,4 to Open and connect the speaker cable to pin 8 (+) and pin 6 (-).

- **ATX Power On/Off Button**

  Pin 9 and 10 connect the ATX power button on front panel to the CPU card, which allows users to control ATX power supply to be power on/off.

- **System Reset Switch**
  Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning OFF the power switch. It is a better way to reboot your system for a longer life of the system's power supply.

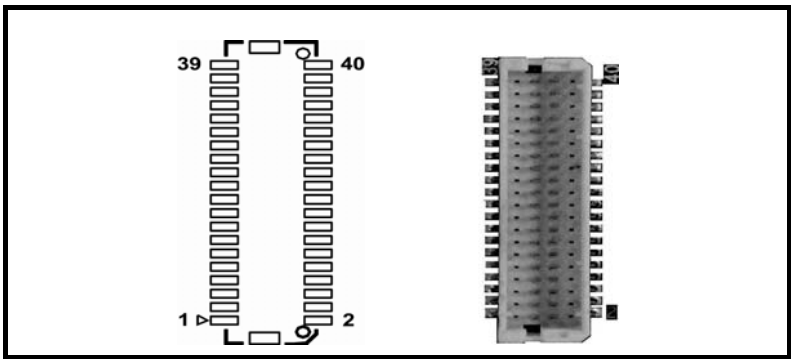
- **HDD Activity LED**

  This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, Pin 13 assigned as Cathode (-), and Pin 14 as Anode (+).

2.4.3 LVDS Connector (CN2)

The board has a 40-pin connector **CN2** for LVDS Interface LCD. It is strongly recommended to use the matching GL A1001WV-S-2x20P 40-pin connector for LVDS on the board. Pin1~6 VCCM can be set +3V level or +5V level by JP2.(See Section 2.3.2)

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C.	8	N.C.
9	GND	10	GND
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	GND
17	N.C.	18	N.C.
19	N.C.	20	N.C.
21	GND	22	GND
23	Channel A D0-	24	N.C.
25	Channel A D0+	26	N.C.
27	GND	28	GND
29	Channel A D1-	30	N.C.
31	Channel A D1+	32	N.C.
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

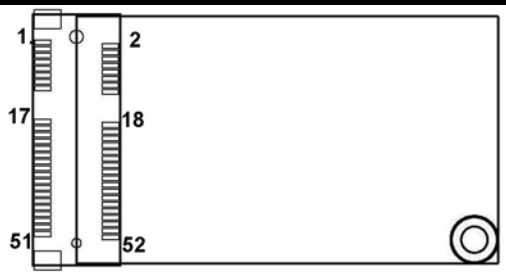


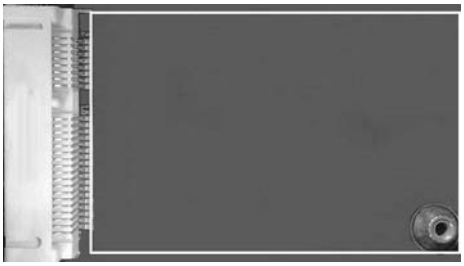
2.4.4 PCI-Express Mini Card Connector (CN3)

CN3 is a PCI Express Mini Card connector with support for a PCI Express x1 link and a USB 2.0 link. A PCI Express Mini Card can be applied to either PCI Express or USB 2.0. The USB 2.0 support will be helpful during the transition to PCI Express, because peripheral vendors will need time to design their chipsets to have the PCI Express function. During the transition, PCI Express Mini Cards can be quickly implemented by using USB 2.0.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	No use
21	GND	22	PERST#
23	PE_RXN3	24	+3.3VSB
25	PE_RXP3	26	GND

27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3	32	SMB_DATA
33	PE_TXP3	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB

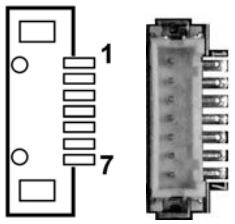




2.4.5 Inverter Connector/LVDS Backlight Connector (CN4)

The **CN4** is DF13-7S-1.25C 7-pin connector for inverter. We strongly recommend you to use the matching DF13-7S-1.25C connector.

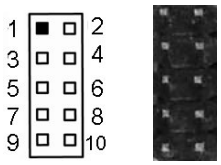
Pin	Signal
1	VBL1(+12V Level)
2	VBL1(+12V Level)
3	VBL2(+5V Level)
4	VBL_ENABLE
5	GND
6	GND
7	GND



2.4.6 2*5 Pin DIO Connector (CN6)

The board is equipped with a 8-channel (default: 3in, 5out) digital I/O connector that meets requirements for a system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. The digital I/O is controlled via software programming. (The application method can be referred to Appendix B.)

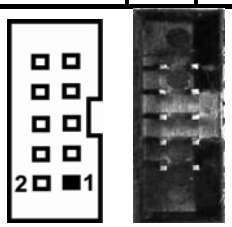
Pin	Signal	Pin	Signal
1	DIO 0(Bit0)	2	DIO 3(Bit3)
3	DIO 1(Bit1)	4	DIO 4(Bit4)
5	DIO 2(Bit2)	6	DIO 5(Bit5)
7	Ground (GND)	8	DIO 6(Bit6)
9	Ground (GND)	10	DIO 7(Bit7)



2.4.7 COM 2 Connector (CN7)

The COM port have +5V level power capability on DCD and +12V level power capability for RI, depending on the JP9 jumper setting. (See Section 2.3.7). The RS-232 pin assignments are listed on the following table.

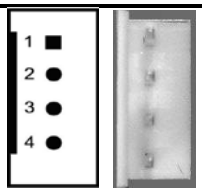
Pin	Signal	Pin	Signal
1	Data Carrier Detect (DCD)	2	Data Set Ready (DSR)
3	Receive Data (RXD)	4	Request to Send (RTS)
5	Transmit Data (TXD)	6	Clear to Send (CTS)
7	Data Terminal Ready (DTR)	8	Ring Indicator (RI)
9	Ground (GND)	10	N.C.



2.4.8 Power output Connector (CN8)

The CN8 can be the power supply for SATA 2.5" HD or the optional LVDS module AX95601.

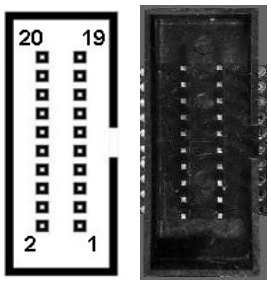
Pin	Signal
1	+12V level
2	GND
3	GND
4	+5V level



2.4.9 COM 3 & COM 4 Connector (CN9)

The COM 3 & COM 4 port have +5V level power capability on DCD and 12V level power capability for RI, depending on the JP8 and JP7 jumper setting. (See Section 2.3.5 & 2.3.6). The RS-232 pin assignments are listed on the following table.

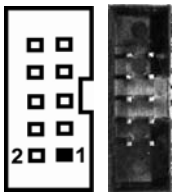
Pin	Signal	Pin	Signal
1	DCD3	2	DSR3
3	RXD3	4	RTS3
5	TXD3	6	CTS3
7	DTR3	8	RI3
9	GND	10	N.C.
11	DCD4	12	DSR4
13	RXD4	14	RTS4
15	TXD4	16	CTS4
17	DTR4	18	RI4
19	GND	20	N.C.



2.4.10 Audio Connector (CN10)

Pin 7 and Pin 9 can be referred to JP13 Jumper Setting to set the audio source.

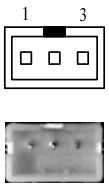
Pin	Signal	Pin	Signal
1	MIC_IN	2	Ground (GND)
3	LINE_IN_L	4	Ground (GND)
5	LINE_IN_R	6	Ground (GND)
7	AUDIO_OUT_L	8	Ground (GND)
9	AUDIO_OUT_R	10	Ground (GND)



2.4.11 SMBus Connector (CN11)

Connector CN11 is for SMBUS interface support.

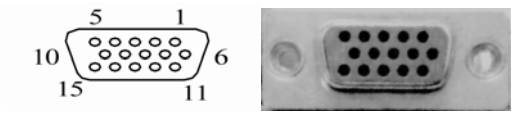
Pin	Signal
1	CLOCK
2	DATA
3	GND



2.4.12 VGA Connector (CN13)

CN13 is a slim type 15-pin D-Sub connector which is common for the CRT VGA display. The VGA interface configuration can be configured via the software utility.

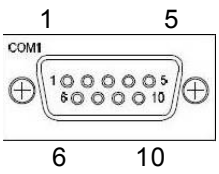
Pin	Signal	Pin	Signal	Pin	Signal
1	Red	2	Green	3	Blue
4	N.C.	5	GND	6	DETECT
7	GND	8	GND	9	VCC
10	GND	11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync	15	DDC CLK



2.4.13 COM1 Connector (COM1)

The COM1 Port connector is a standard DB-9 connector. This port is with +5V level power capability on DCD and +12V level power capability for RI, depending on the JP10 jumper setting. (See Section 2.3.8). The pin assignment of RS-232/RS-422/RS-485 is listed on the following table. If you need COM1 port to support RS-422 or RS-485, please refer to section 2.3.4.

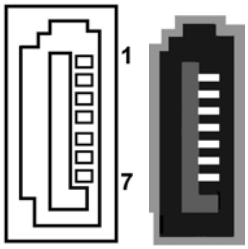
Pin	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	No Connection
4	DTR	RX-	No Connection
5	Ground	No use	No Use
6	DSR	No use	No Use
7	RTS	No use	No Use
8	CTS	No use	No Use
9	RI	No use	No Use



2.4.14 Serial ATA Connectors (SATA1, SATA2)

These SATA connectors are for high-speed SATA interface ports and they can be connected to hard disk devices.

Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND

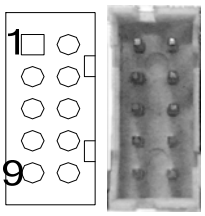


2.4.15 USB 2.0 Wafer (CN14)

These Universal Serial Bus (USB) connectors on this board are for installing versatile USB interface peripherals. This is a 10-pin standard USB connector**.**

CN14: Universal Serial Bus Port [5:4]
These ports can be routed to UHCI controller #3 or EHCI controller #3.

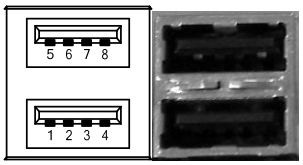
Pin	Signal USB port 6	Pin	Signal USB port 7
1	USB VCC (+5V level)	2	USB VCC (+5V level)
3	USB #4_D-	4	USB #5_D-
5	USB #4_D+	6	USB #5_D+
7	Ground (GND)	8	Ground (GND)
9	Ground (GND)	10	Ground (GND)



2.4.16 USB2.0 Stack Port (USB1)

USB1: Universal Serial Bus Port [1:0]
These ports can be routed to UHCI controller #1 or EHCI controller #1.

Pin	Signal USB Port 0	Pin	Signal USB Port 1
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #0_D-	6	USB #1_D-
3	USB #0_D+	7	USB #1_D+
4	Ground (GND)	8	Ground (GND)



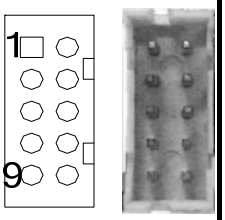
2.4.17 USB2.0 Wafer (CN15)

These Universal Serial Bus (USB) connectors on this board are for installing versatile USB interface peripherals. This is a 10-pin standard USB connector.

CN15 has +5V level standby power which can provide power during the system is in suspend mode.

CN15: Universal Serial Bus Port [3:2]
hese ports can be routed to UHCI controller #2 or EHCI controller #2.

Pin	Signal USB Port 2	Pin	Signal USB Port 3
1	USB VCC (+5V level standby ower)	2	USB VCC (+5V level standby power)
3	USB #2_D-	4	USB #3_D-
5	USB #2_D+	6	USB #3_D+
7	Ground (GND)	8	Ground (GND)
9	Ground (GND)	10	Ground (GND)

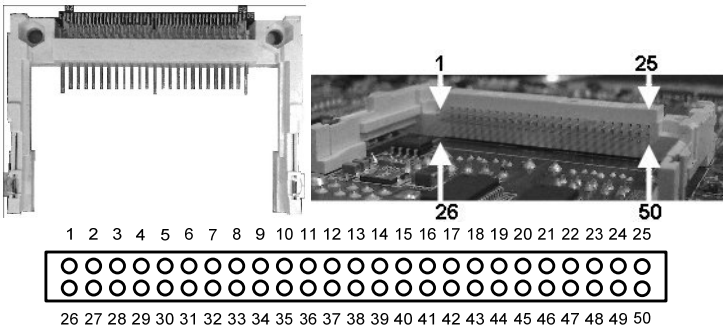


2.4.18 CompactFlash™ Socket (SCF1)

The board is equipped with a CompactFlash™ disk type-II socket on the solder side to support an IDE interface CompactFlash™ disk card with DMA mode supported. The socket is especially designed to avoid incorrect installation of the CompactFlash™ disk card. When installing or removing the CompactFlash™ disk card, please make sure the system power is off.

Pin13 and Pin 38 power voltage can be referred to JP3 Jumper Setting (See Section 2.3.3).

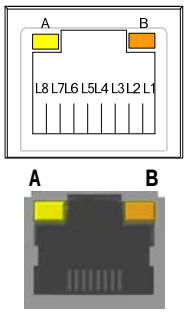
Pin	Signal	Pin	Signal
1	GND	26	CD1-
2	Data 3	27	Data 11
3	Data 4	28	Data 12
4	Data 5	29	Data 13
5	Data 6	30	Data 14
6	Data 7	31	Data 15
7	CS0#	32	CS1#
8	Address 10	33	VS1#
9	ATASEL	34	IORD#
10	Address 9	35	IOWR#
11	Address 8	36	WE#
12	Address 7	37	INTR
13	VCC	38	VCC
14	Address 6	39	CSEL#
15	Address 5	40	VS2#
16	Address 4	41	RESET#
17	Address 3	42	IORDY#
18	Address 2	43	DMAREQ
19	Address 1	44	DMAACK-
20	Address 0	45	DASP#
21	Data 0	46	PDIAG#
22	Data 1	47	Data 8
23	Data 2	48	Data 9
24	IOCS16#	49	Data 10
25	CD2#	50	GND



2.4.19 Ethernet Connector (LAN1, LAN2)

The RJ-45 connector is for Ethernet. To connect the board to a 1000/100/10 Base-T hub, just plug one end of the cable into connector and connect the other end (phone jack) to a 1000/100/10-Base-T hub.

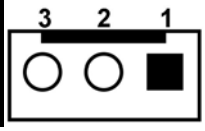
Pin	Signal	Pin	Signal
L1	MDI0+	L5	MDI2-
L2	MDI0-	L6	MDI1-
L3	MDI1+	L7	MDI3+
L4	MDI2+	L8	MDI3-
A	Active LED (Yellow)		
B	*100 LAN LED (Green)/ 1000 LAN LED (Orange)*		



2.4.20 CPU Fan Connector (FAN1)

The FAN1 is a CPU fan connector. You can find the FAN speed on the BIOS Setup Utility when the CPU fan is installed. (See BIOS Setup Utility: Advanced → Hardware Health).

Pin	Description
1	GND
2	+12V level
3	speed feedback



CHAPTER 3
HARDWARE DESCRIPTION

3.1 Microprocessors

The **CAPA801** Series supports Intel® Atom™ processor N455/D425/D525, which make your system operated under Windows XP, Windows VISTA and Windows 7 environments.The system performance depends on the microprocessor.

3.2 BIOS

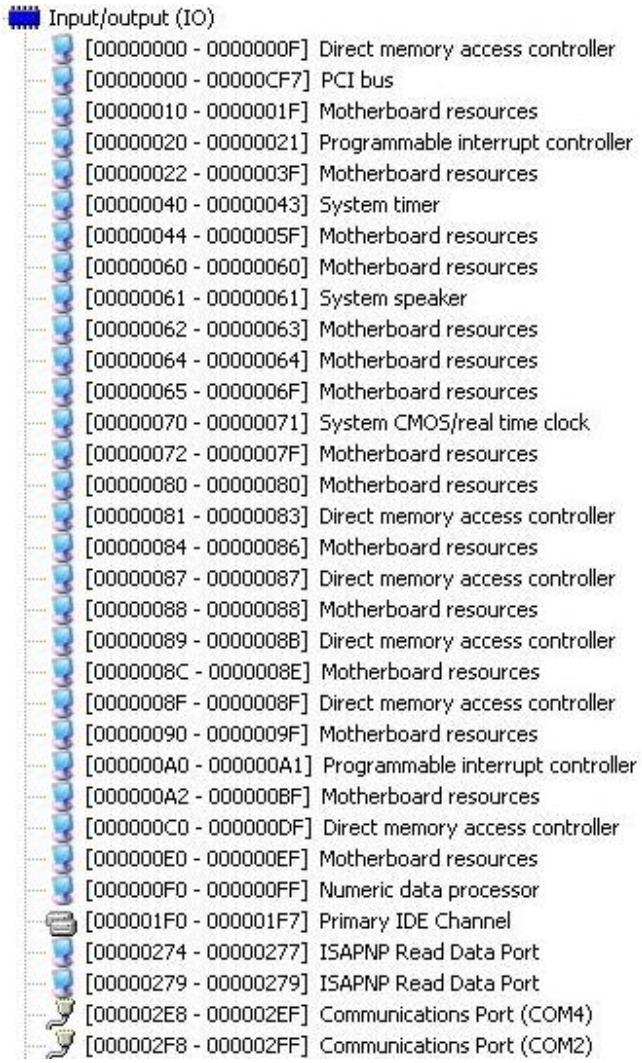
The **CAPA801** Series uses AMI BIOS with a single 8Mbit SPI Flash, DMI, Plug and Play.

3.3 System Memory

The **CAPA801** Series industrial CPU card supports one 204-pin unbuffered DDR3 SO-DIMM sockets for a maximum memory of 4GB DDR3 SDRAMs. The memory module can come in sizes of 512MB, 1GB, 2GB and 4GB.

3.4 I/O Port Address Map

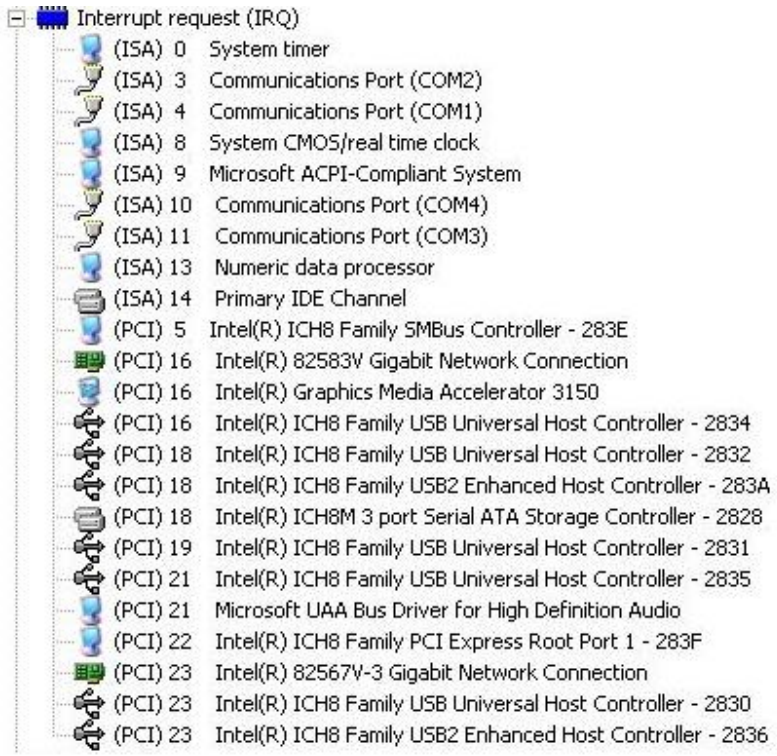
There are total 1KB port addresses (under OS WinXP) available for assignment to other devices via I/O expansion cards.


Input/output (IO)
[00000000 - 0000000F] Direct memory access controller
[00000000 - 00000CF7] PCI bus
[00000010 - 0000001F] Motherboard resources
[00000020 - 00000021] Programmable interrupt controller
[00000022 - 0000003F] Motherboard resources
[00000040 - 00000043] System timer
[00000044 - 0000005F] Motherboard resources
[00000060 - 00000060] Motherboard resources
[00000061 - 00000061] System speaker
[00000062 - 00000063] Motherboard resources
[00000064 - 00000064] Motherboard resources
[00000065 - 0000006F] Motherboard resources
[00000070 - 00000071] System CMOS/real time clock
[00000072 - 0000007F] Motherboard resources
[00000080 - 00000080] Motherboard resources
[00000081 - 00000083] Direct memory access controller
[00000084 - 00000086] Motherboard resources
[00000087 - 00000087] Direct memory access controller
[00000088 - 00000088] Motherboard resources
[00000089 - 0000008B] Direct memory access controller
[0000008C - 0000008E] Motherboard resources
[0000008F - 0000008F] Direct memory access controller
[00000090 - 0000009F] Motherboard resources
[000000A0 - 000000A1] Programmable interrupt controller
[000000A2 - 000000BF] Motherboard resources
[000000C0 - 000000DF] Direct memory access controller
[000000E0 - 000000EF] Motherboard resources
[000000F0 - 000000FF] Numeric data processor
[000001F0 - 000001F7] Primary IDE Channel
[00000274 - 00000277] ISAPNP Read Data Port
[00000279 - 00000279] ISAPNP Read Data Port
[000002E8 - 000002EF] Communications Port (COM4)
[000002F8 - 000002FF] Communications Port (COM2)

[000003B0 - 000003BB] Intel(R) Graphics Media Accelerator 3150
[000003C0 - 000003DF] Intel(R) Graphics Media Accelerator 3150
[000003E8 - 000003EF] Communications Port (COM3)
[000003F6 - 000003F6] Primary IDE Channel
[000003F8 - 000003FF] Communications Port (COM1)
[00000400 - 0000041F] Intel(R) ICH8 Family SMBus Controller - 283E
[000004D0 - 000004D1] Motherboard resources
[00000500 - 0000053F] Motherboard resources
[00000800 - 0000087F] Motherboard resources
[00000A00 - 00000A0F] Motherboard resources
[00000A00 - 00000AE7] Motherboard resources
[00000D00 - 0000FFFF] PCI bus
[0000C000 - 0000C007] Intel(R) Graphics Media Accelerator 3150
[0000C080 - 0000C09F] Intel(R) 82567V-3 Gigabit Network Connection
[0000C400 - 0000C41F] Intel(R) ICH8 Family USB Universal Host Controller - 2835
[0000C480 - 0000C49F] Intel(R) ICH8 Family USB Universal Host Controller - 2834
[0000C800 - 0000C81F] Intel(R) ICH8 Family USB Universal Host Controller - 2832
[0000C880 - 0000C89F] Intel(R) ICH8 Family USB Universal Host Controller - 2831
[0000CC00 - 0000CC1F] Intel(R) ICH8 Family USB Universal Host Controller - 2830
[0000D080 - 0000D08F] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000D400 - 0000D40F] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000D480 - 0000D483] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000D800 - 0000D807] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000D880 - 0000D883] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000DC00 - 0000DC07] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000E000 - 0000EFFF] Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
[0000EC00 - 0000EC1F] Intel(R) 82583V Gigabit Network Connection
[0000FFA0 - 0000FFAF] Intel(R) ICH8M Ultra ATA Storage Controllers - 2850

3.5 Interrupt Controller

The **CAPA801 Series** is a 100% PC compatible control board. It consists of 16 interrupt request lines, and four out of them can be programmable. The mapping list of the 16 interrupt request lines is shown as the following table.


Interrupt request (IRQ)
(ISA) 0 System timer
(ISA) 3 Communications Port (COM2)
(ISA) 4 Communications Port (COM1)
(ISA) 8 System CMOS/real time clock
(ISA) 9 Microsoft ACPI-Compliant System
(ISA) 10 Communications Port (COM4)
(ISA) 11 Communications Port (COM3)
(ISA) 13 Numeric data processor
(ISA) 14 Primary IDE Channel
(PCI) 5 Intel(R) ICH8 Family SMBus Controller - 283E
(PCI) 16 Intel(R) 82583V Gigabit Network Connection
(PCI) 16 Intel(R) Graphics Media Accelerator 3150
(PCI) 16 Intel(R) ICH8 Family USB Universal Host Controller - 2834
(PCI) 18 Intel(R) ICH8 Family USB Universal Host Controller - 2832
(PCI) 18 Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A
(PCI) 18 Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
(PCI) 19 Intel(R) ICH8 Family USB Universal Host Controller - 2831
(PCI) 21 Intel(R) ICH8 Family USB Universal Host Controller - 2835
(PCI) 21 Microsoft UAA Bus Driver for High Definition Audio
(PCI) 22 Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
(PCI) 23 Intel(R) 82567V-3 Gigabit Network Connection
(PCI) 23 Intel(R) ICH8 Family USB Universal Host Controller - 2830
(PCI) 23 Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836

CHAPTER 4
AMI BIOS SETUP UTILITY

This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:
1. Turn on the computer and press the <Del> key immediately.
2. After pressing the <Delete> key, the main BIOS setup menu displays. You can access to other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.

4.2 Navigation Keys

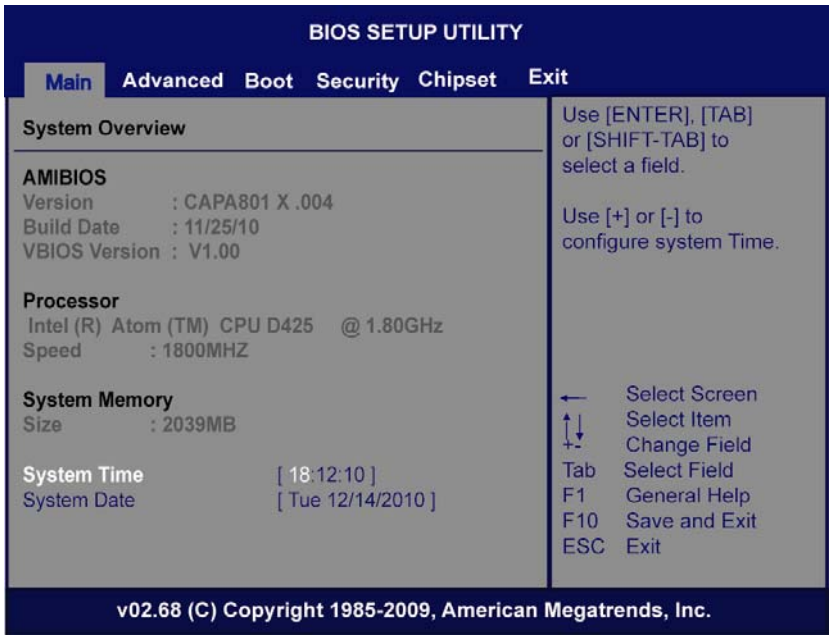
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.
These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.

Note *Some of navigation keys differ from one screen to another.*

← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F10	The <F10> key allows you to save any changes you have made and exit Setup. Press the <F10> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3 Main Menu

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS Setup screen is shown below.



- **System Time/Date**

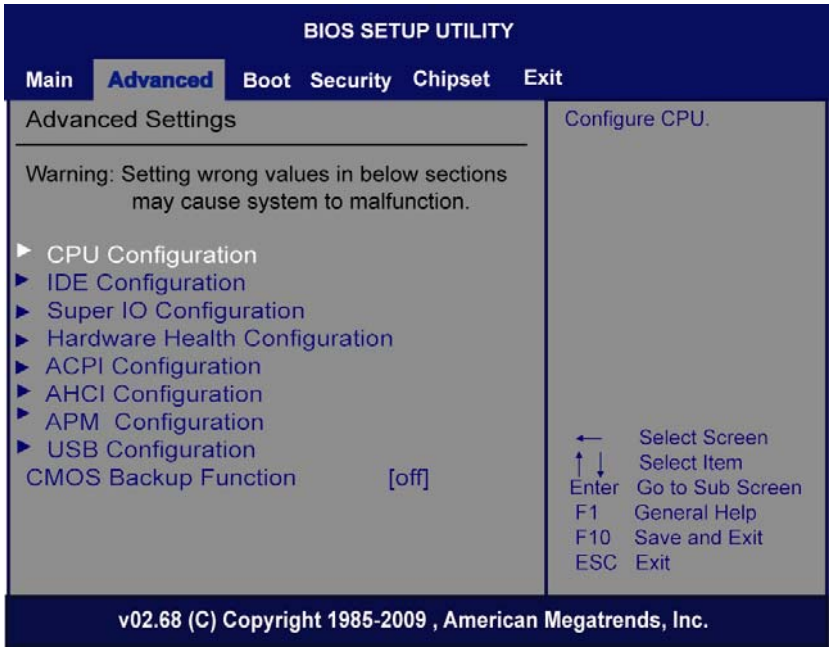
  Use this option to change the system time and date. Highlight *System Time* or *System Date* using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

4.4 Advanced Menu

The Advanced menu allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

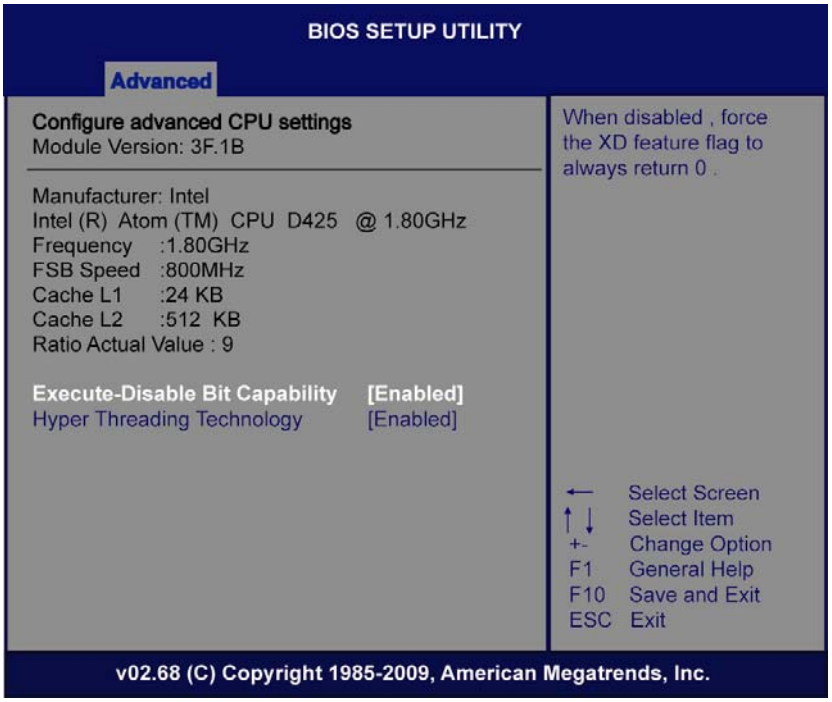
- CPU Configuration
- IDE Configuration
- Super IO Configuration
- Hardware Health Configuration
- ACPI Configuration
- AHCI Configuration
- APM Configuration
- USB Configuration

For items marked with "►", please press <Enter> for more options.



- **Configure advanced CPU settings**

  This screen shows the CPU Configuration, and you can change the value of the selected option.


BIOS SETUP UTILITY
Advanced
Configure advanced CPU settings
Module Version: 3F.1B
Manufacturer: Intel
Intel (R) Atom (TM) CPU D425 @ 1.80GHz
Frequency :1.80GHz
FSB Speed :800MHz
Cache L1 :24 KB
Cache L2 :512 KB
Ratio Actual Value : 9
Execute-Disable Bit Capability [Enabled]
Hyper Threading Technology [Enabled]
When disabled , force the XD feature flag to always return 0 .
← Select Screen
↑ ↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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  - **Execute-Disable Bit Capability**

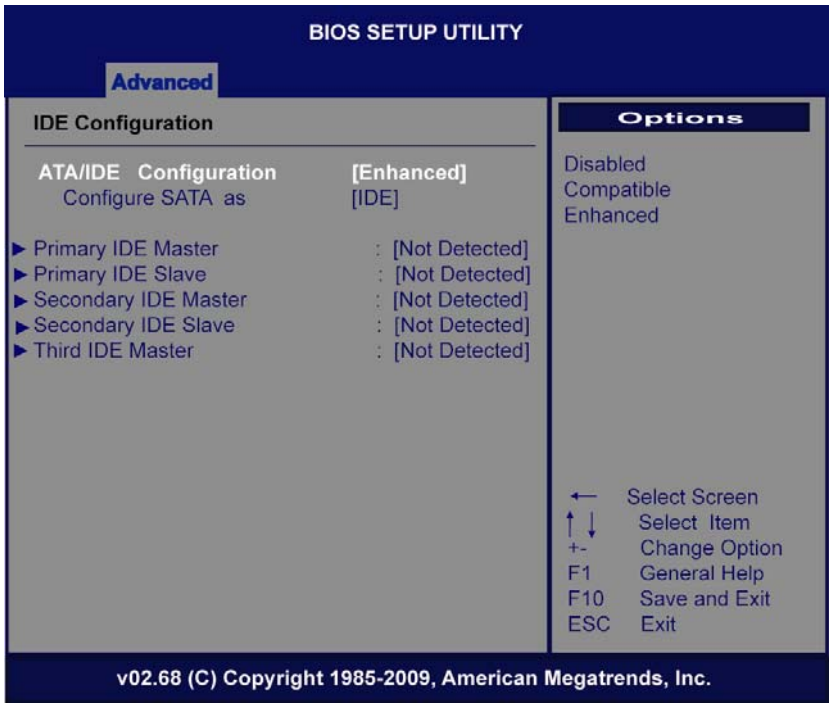
    Use this item to enable or disable the No-Execution Page Protection Technology.

  - **Hyper Threading Technology**

    Use this item to enable or disable Hyper-Threading Technology, which makes a single physical processor perform multi-tasking function as two logical ones.

- **IDE Configuration**

  Use this screen to select options for the IDE Configuration and change the value of the selected option. Available options of the selected item appear on the right side of the screen.
  For items marked with "►", please press <Enter> for more options.



- **ATA/IDE Configuration**

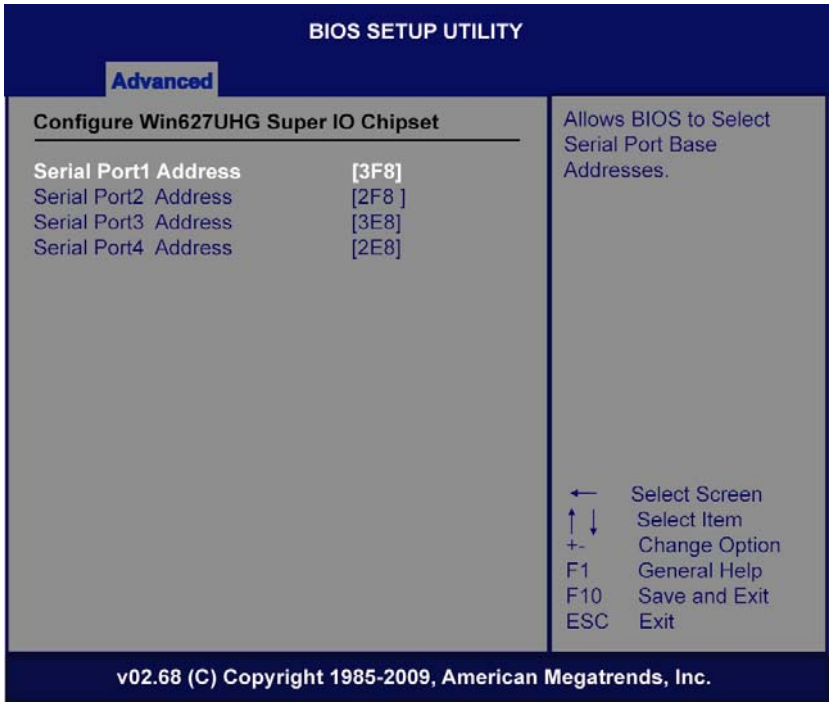
  Use this item to specify the integrated IDE controller. There are three options for your selection: Disabled, Compatible and Enhanced.

- **Primary/Secondary/Third IDE Master**

  Use this item to select one of the hard disk drives to configure IDE devices installed in the system by pressing <Enter> for more options.

- **Super IO Configuration**

Use this item for the Super IO Configuration, and change the value of the selected option.


BIOS SETUP UTILITY
Advanced
Configure Win627UHG Super IO Chipset
Serial Port1 Address [3F8]
Serial Port2 Address [2F8]
Serial Port3 Address [3E8]
Serial Port4 Address [2E8]
Allows BIOS to Select Serial Port Base Addresses.
← Select Screen
↑ ↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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- **Serial Port1 Address**

  This item specifies the base I/O port address and Interrupt Request address of serial port 1. The Optimal setting is *3F8/IRQ4*. The Fail-Safe default setting is *Disabled.*

- **Serial Port2 Address**

  This item specifies the base I/O port address and Interrupt Request address of serial port 2. The Optimal setting is *2F8/IRQ3*. The Fail-Safe setting is *Disabled.*

- **Serial Port3 Address**

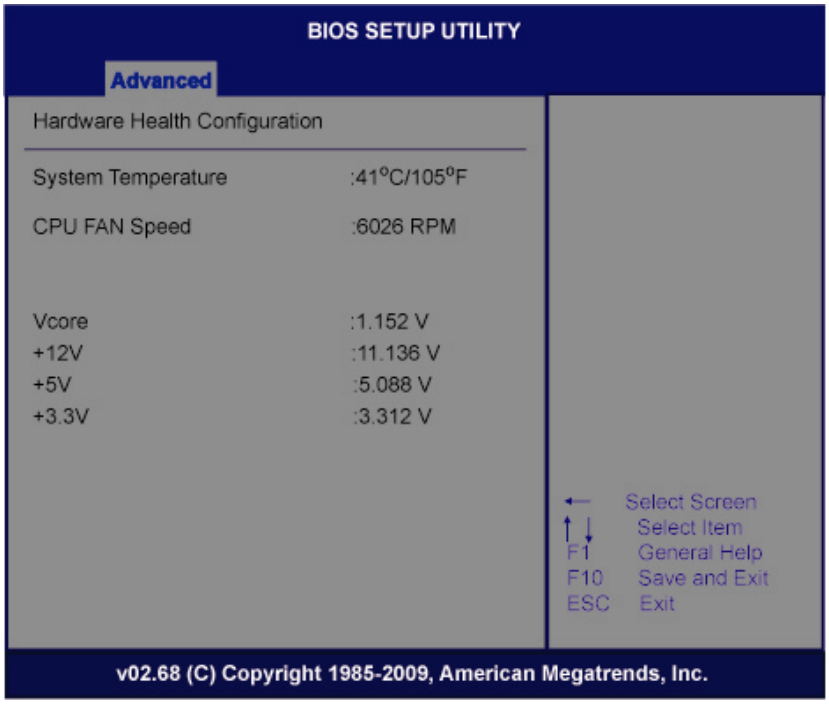
  This item specifies the base I/O port address and Interrupt Request address of serial port 3.

- **Serial Port4 Address**

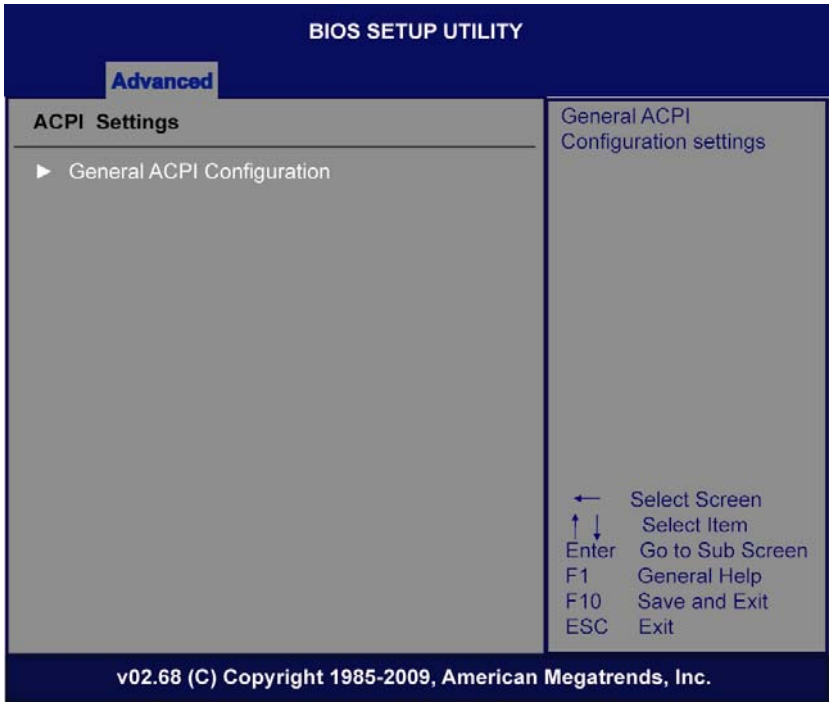
  This item specifies the base I/O port address and Interrupt Request address of serial port 4.

- **Hardware Health Configuration**

  This item shows the Hardware Health Configuration, which displays the temperature of System, CPUFAN Speed and Vcore, +12V, +5V, +3.3V.



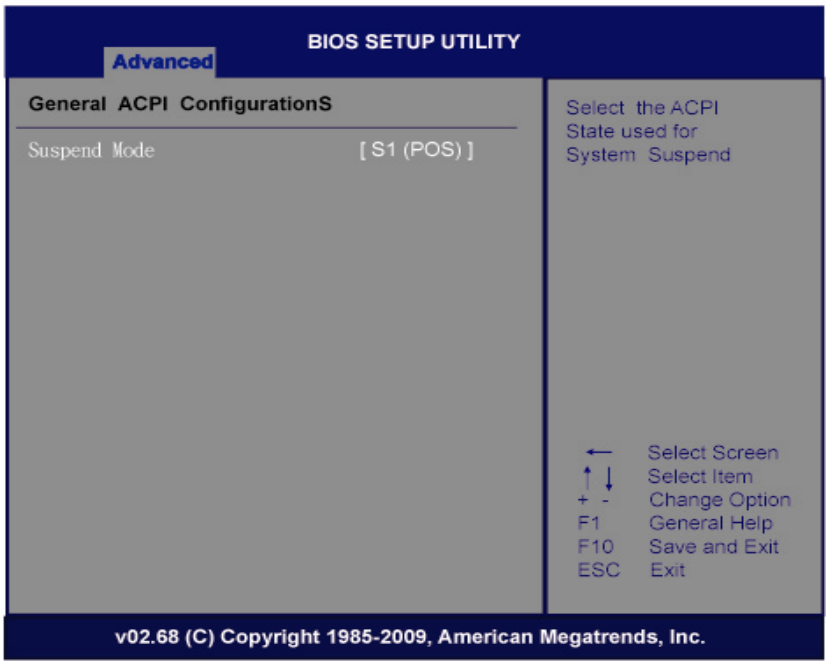
- **ACPI Settings**
  Use this item to select options for the ACPI Settings, and change the value of the selected option.



  - **General ACPI Configuration**
    Scroll this item and press <Enter> to view the General ACPI Configuration sub menu, which contains General ACPI (Advanced Configuration and Power Management Interface) options for your configuration.

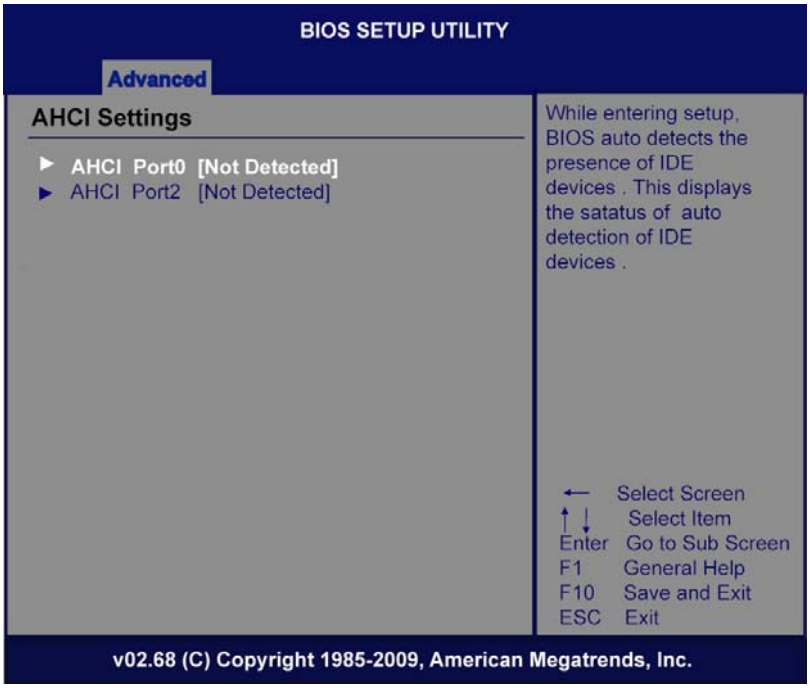
- **General ACPI Configuration/Suspend mode**

  Use this item to select which in the Advanced Configuration and Power Interface(ACPI) state to be used for system suspend. Here are the options for your selection, S1(POS), S3(STR) and Auto.



- **AHCI Configuration**

  Use this item to select options for the AHCI Configuration and change the value of the selected option.


BIOS SETUP UTILITY
Advanced
AHCI Settings
AHCI Port0 [Not Detected]
AHCI Port2 [Not Detected]
While entering setup, BIOS auto detects the presence of IDE devices . This displays the satatus of auto detection of IDE devices .
← Select Screen
↑ ↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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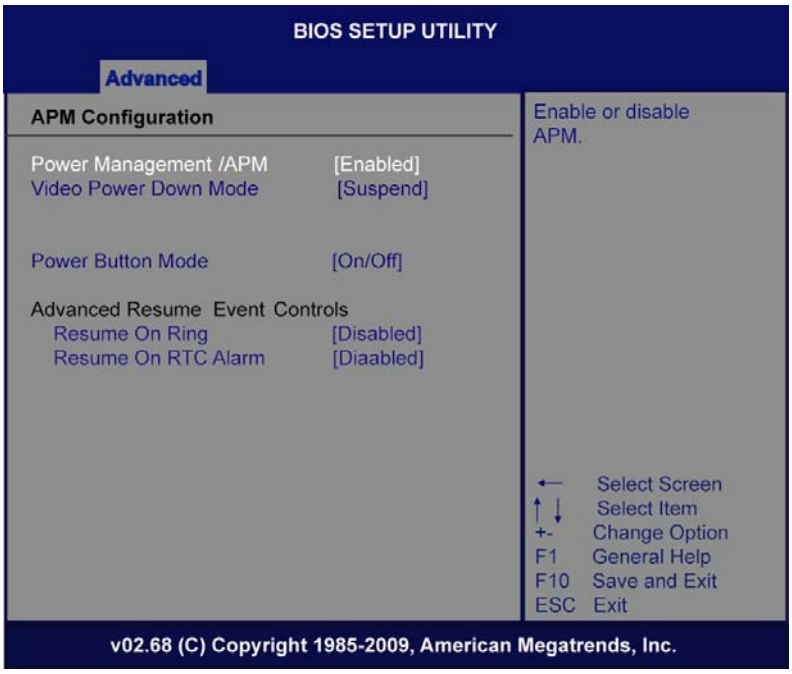
- **APM Configuration**

  Use this item to select options for the APM Configuration, and change the value of the selected option. Available options of the selected item appear on the right side of the screen.



  - **Power Management/APM**

    Set this item to allow Power Management/APM support. The default setting is Enabled.

Disabled	Set this item to prevent the chipset power management and APM (Advanced Power Management) features.
Enabled	Set this item to allow the chipset power management and APM (Advanced Power Management) features. This is the default setting.

- **Video Power Down Mode**

  This option specifies the Power State. When the BIOS places it in a power saving state, the video subsystem enters when the BIOS places it in a power saving state after the specified period of display inactivity has expired. The default setting is Suspend.

Disabled	This setting prevents the BIOS from initiating any power saving modes concerned with the video display or monitor.
Suspend	This option places the monitor into suspend mode after the specified period of display inactivity has expired. This means the monitor is not off. The screen will appear blacked out. The standards do not cite specific power ratings because they vary from monitor to monitor, but this setting use less power than Standby mode. This is the default setting.

- **Power Button Mode**

  This option specifies how the externally mounted power button on the front of the computer chassis is used. The default setting is On/Off.

On/Off	Pushing the power button turns the computer on or off. This is the default setting. This is the default setting.
Suspend	Pushing the power button places the computer in Suspend mode or Full On power mode.

-
- ***** Advanced Resume Event Controls *****
- **Resume On Ring**

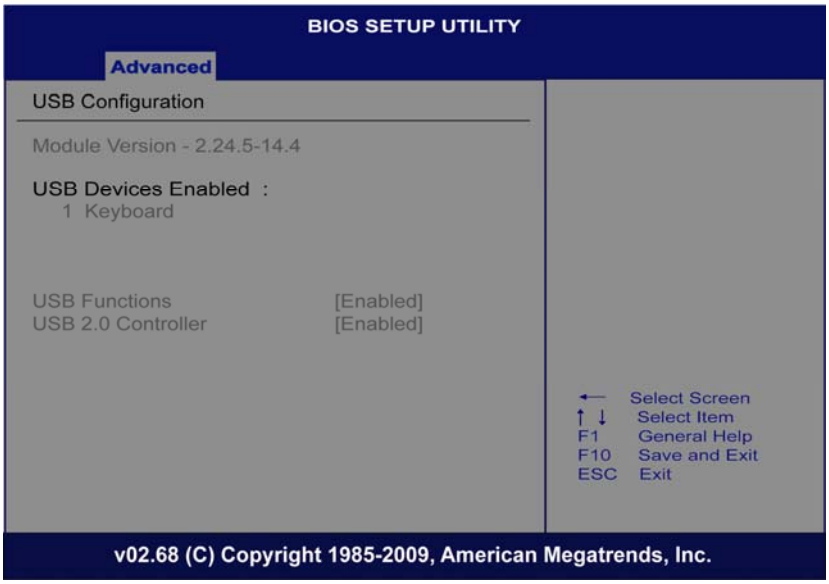
  This item enables or disables the function of Resume On Ring that resumes the system through incoming calls.

- **Resume On RTC Alarm**

  This item can be set to enabled and key in Data/time to power on system.

- **USB Configuration**

  You can use this item to select options for the USB Configuration, and change the value of the selected option.



  - **USB Function**

    Use this item to enable or disable USB function.

  - **USB 2.0 Controller**

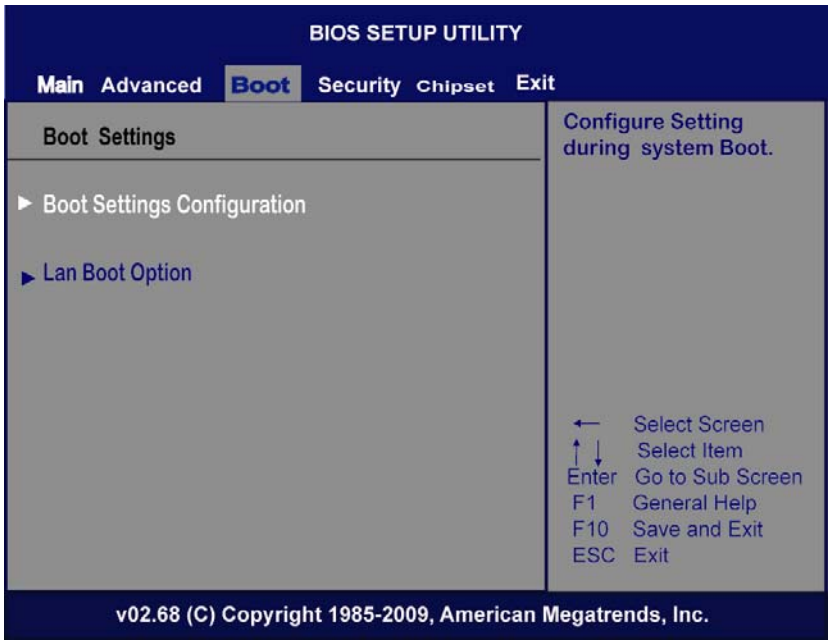
    Use this item to enable or disable the USB 2.0 controller.

4.5 Boot Menu

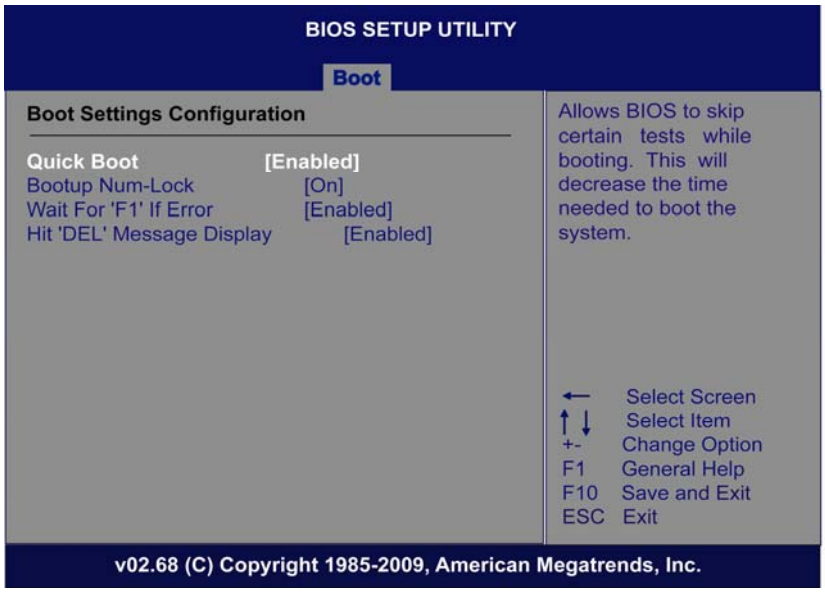
The Boot menu allows users to change boot options of the system. You can select any of the items in the left frame of the screen to go to the sub menus:

- Boot Settings Configuration
- Lan Boot Option

For items marked with "►", please press <Enter> for more options.



- **Boot Settings Configuration**


BIOS SETUP UTILITY
Boot
Boot Settings Configuration
Quick Boot [Enabled]
Bootup Num-Lock [On]
Wait For 'F1' If Error [Enabled]
Hit 'DEL' Message Display [Enabled]
Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
Select Screen
Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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- **Quick Boot**
  Enabling this item lets the BIOS skip some power on self tests (POST). The default setting is Enabled.

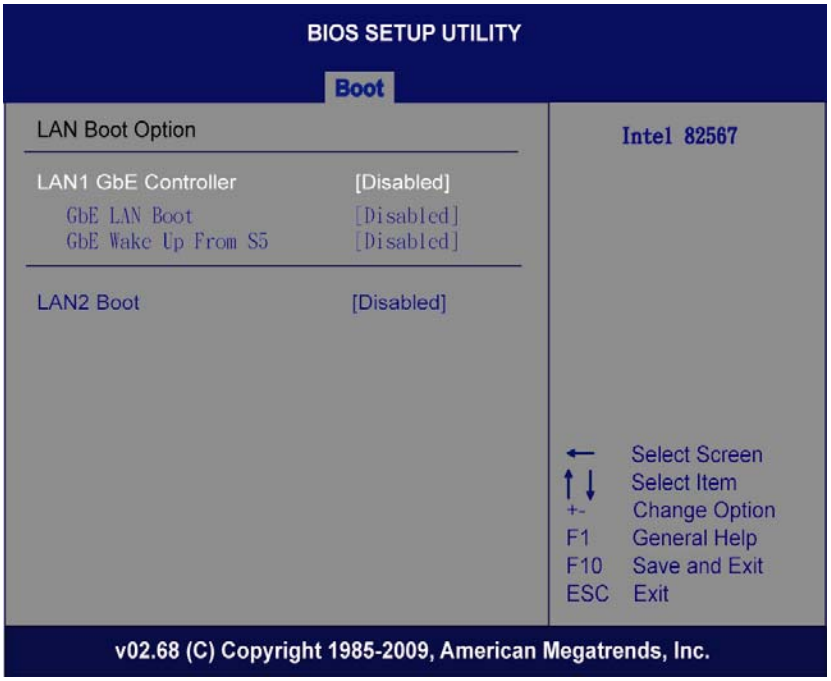
- **Bootup Num-Lock**
  Use this item to select the power-on state for the NumLock. The default setting is On.

- **Wait For 'F1' If Error**
  If this item is enabled, the system waits for the F1 key to be pressed when error occurs. The default setting is Enabled.

- **Hit 'DEL' Message Display**
  If this item is enabled, the system displays the message "Press DEL to run Setup" during POST. The default setting is Enabled.

- **LAN Boot Option**

  Use these items to enable or disable the Boot ROM function of the onboard LAN chip when the system boots up. Available options of the selected item appear on the right side of the screen.

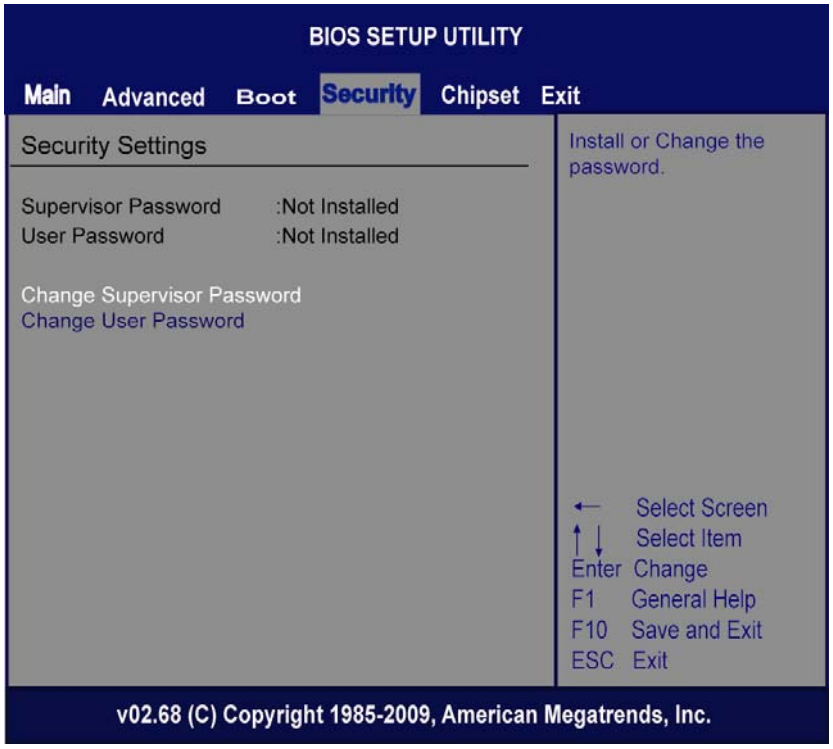


- **LAN1 GbE Controller**
- **This item allows you to enabled or disabled Intel® LAN Contrller.**
- **LAN2 Boot**

  Use these items to enable or disable the Boot ROM function of the onboard LAN chip when the system boots up.

4.6 Security Menu

The Security menu allows users to change the security settings for the system.



- **Supervisor Password**

  This item indicates whether a supervisor password has been set. If the password has been installed, 『 Installed』 displays. If not, 『Not Installed』displays.

- **User Password**

  This item indicates whether a user password has been set. If the password has been installed, 『 Installed』 displays. If not, 『Not Installed』 displays.

- **Change Supervisor Password**
  Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the supervisor password.

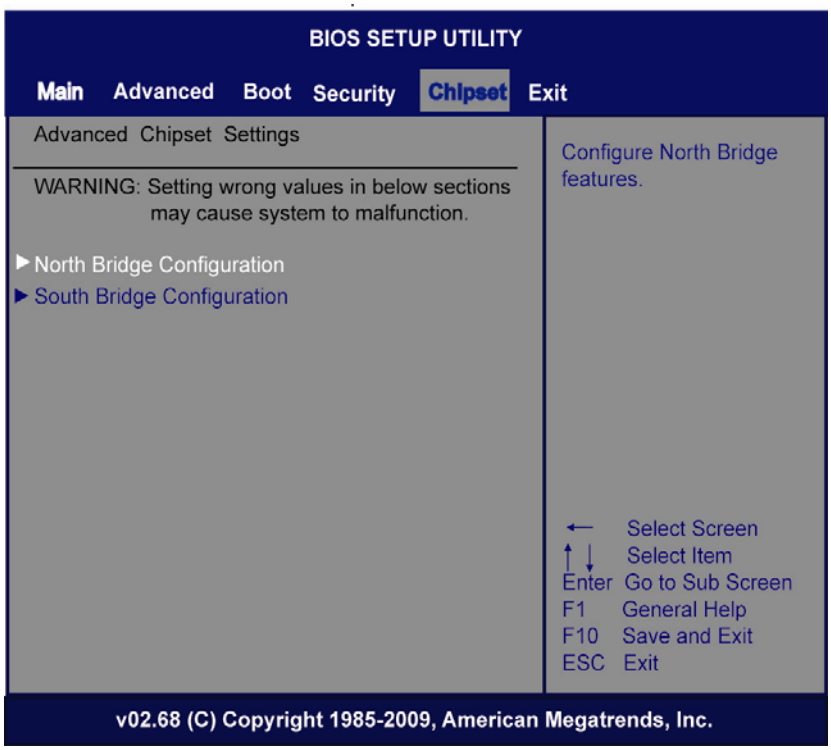
- **Change User Password**
  Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the user password.

4.7 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- North Bridge Configuration
- South Bridge Configuration

For items marked with "►", please press <Enter> for more options.


BIOS SETUP UTILITY
Main Advanced Boot Security Chipset Exit
Advanced Chipset Settings
WARNING: Setting wrong values in below sections may cause system to malfunction.
► North Bridge Configuration
► South Bridge Configuration
Configure North Bridge features.
← Select Screen
↑ ↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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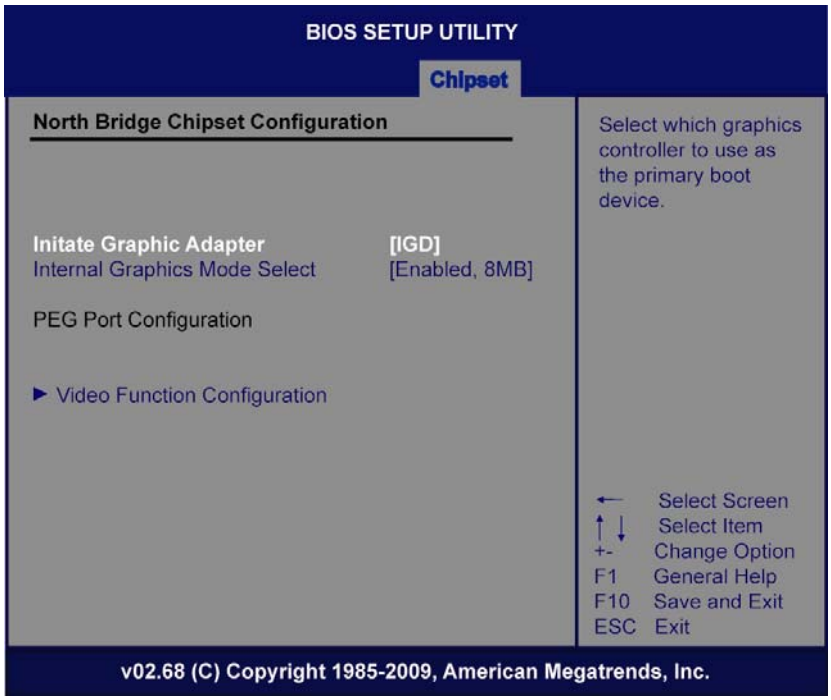
- **North Bridge Configuration**


BIOS SETUP UTILITY
Chipset
North Bridge Chipset Configuration
Select which graphics controller to use as the primary boot device.
Initate Graphic Adapter [IGD]
Internal Graphics Mode Select [Enabled, 8MB]
PEG Port Configuration
► Video Function Configuration
← Select Screen
↑ ↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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➢ **Initate Graphic Adapter**

When using multiple graphics cards, this item can select which graphics controller to be the primary display device during boot.

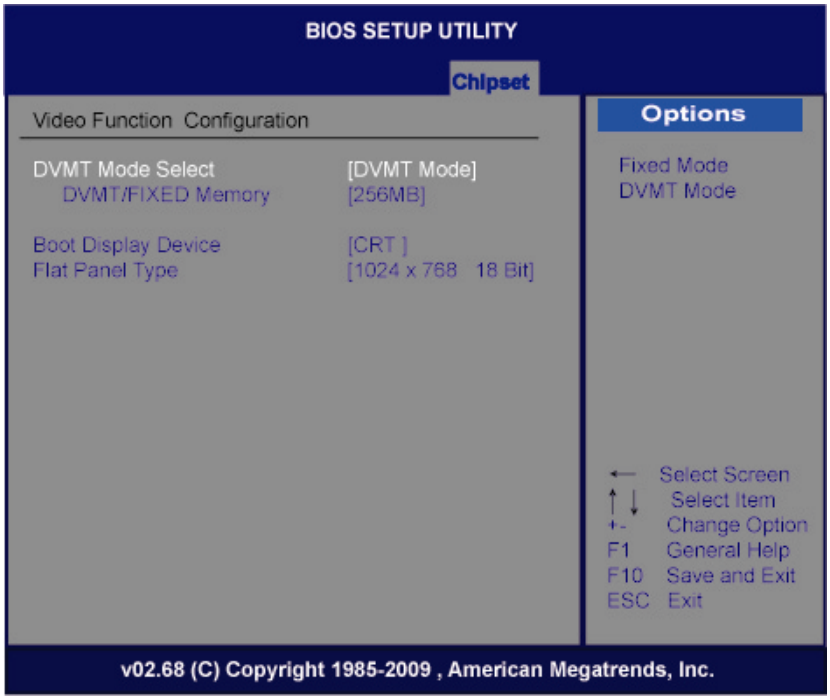
➢ **Internal Graphics Mode Select**

This item allows you to select the amount of system memory used by the internal graphics device.

➢ **Video Function Configuration**

Press <Enter> for the sub-menu for setting up video function.

- **Video Function Configuration**



- **DVMT Mode Select**

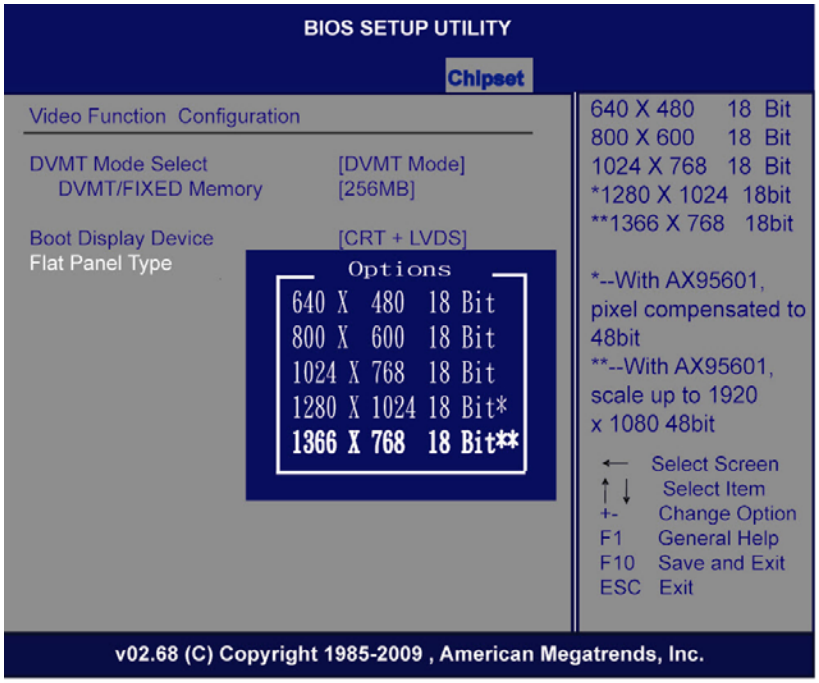
  Allow you to select DVMT (Dianomic Video Memory Technology) mode and Fixed Mode.

- **DVMT/FIXED Memory**

  Allow you to allocate a fixed amount of system memory as graphics memory. Here are the options for your selection, 128MB, 256MB and Maximum DVMT

- **Flat Panel Type**

  Allow you to choose the resolution of the panel.


BIOS SETUP UTILITY
Chipset
Video Function Configuration
DVMT Mode Select [DVMT Mode]
DVMT/FIXED Memory [256MB]
Boot Display Device [CRT + LVDS]
Flat Panel Type
Options
640 X 480 18 Bit
800 X 600 18 Bit
1024 X 768 18 Bit
1280 X 1024 18 Bit*
1366 X 768 18 Bit**
640 X 480 18 Bit
800 X 600 18 Bit
1024 X 768 18 Bit
*1280 X 1024 18bit
**1366 X 768 18bit
*--With AX95601, pixel compensated to 48bit
**--With AX95601, scale up to 1920 x 1080 48bit
Select Screen
Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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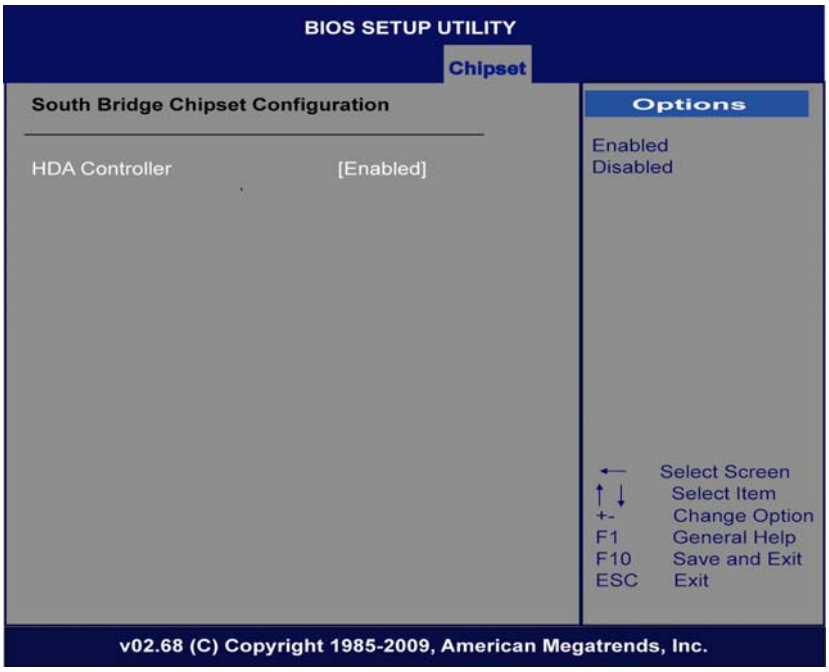
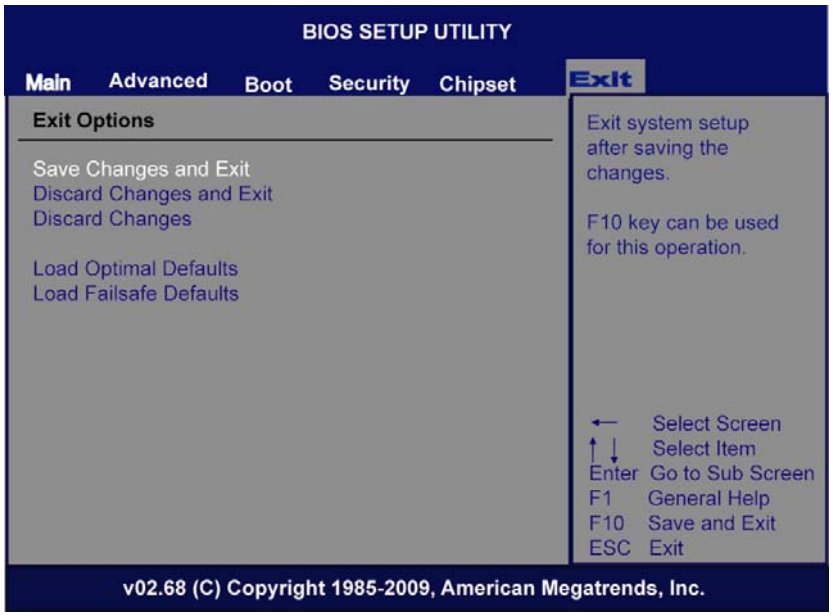
- **South Bridge Configuration**



- **HDA Controller**
  This item allows you to enable or disabled the HD audio support.

4.8 Exit Menu

The Exit menu allows users to load the system configuration with optimal or failsafe default values.



- **Save Changes and Exit**

  When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>. Select Ok to save changes and exit**.**

- **Discard Changes and Exit**

  Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes and Exit from the Exit menu and press <Enter>. Select Ok to discard changes and exit.

- **Discard Changes**

Use this item to abandon all changes.

- **Load Optimal Defaults**

  It automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems.

  Select Load Optimal Defaults from the Exit menu and press <Enter>.

- **Load Fail-Safe Defaults**

  It automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.

  Select Load Fail-Safe Defaults from the Exit menu and press <Enter>. Select Ok to load Fail-Safe defaults.

APPENDIX A
WATCHDOG TIMER

What is Watchdog Timer

The integrated Watchdog Timer can be set up by programming. There are 1~255 levels available. As long as the vaule of timer is set, after enabling, the countdown of the value is starting. It needs to reset or disable watchdog, otherwise auto-reset will be running when the value is counted to 0.

How to Use the Watchdog Timer

- **Assembler Sample Code**

```
;Enable WDT:
    Mov     dx,2Eh
    Mov     al,87h          ;Un-lock super I/O
    out     dx,al
    out     dx,al

;Select Logic device:
    mov     dx,2Eh
    mov     al,07h
    out     dx,al
    mov     dx,2Fh
    mov     al,08h
    out     dx,al

;Activate WDT:
    mov     dx,2Eh
    Mov     al,30h
    out     dx,al
    mov     dx,2Fh
    mov     al,01h
    out     dx,al

;Set Second or Minute :
    Mov     dx,2Eh
```

```
    Mov     al,0F5h
    out     dx,al
    mov     dx,2Fh
    mov     al,Nh           ;N=00h or 08h(See below Note)
    out     dx,al

;Set base timer :
    mov     dx,2Eh
    mov     al,0F6h
    out     dx,al
    mov     dx,2Fh
    mov     al,Mh           ;M=00h,01h,02h,.....FFh (Hex),Value=0 to 255
    out     dx,al           ; (See below Note)

;Disable WDT:
    mov     dx,2Eh
    mov     al,30h
    out     dx,al
    mov     dx,2Fh
    mov     al,00h          ;Can be disable at ant time
    out     dx,al
```

Note:

When N's value is 00h, the time base is set second.

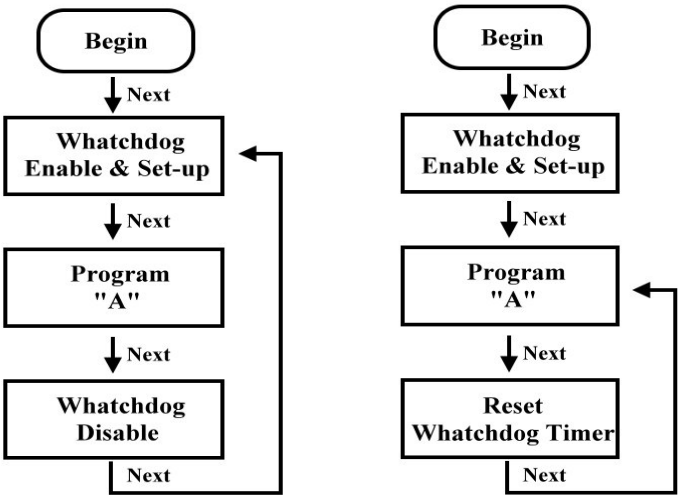
M = 00: Time-out Disable
01: Time-out occurs after 1 second
02: Time-out occurs after 2 seconds
03: Time-out occurs after 3 seconds
.
.
FF: Time-out occurs after 255 seconds

When N's value is 08h, the time base is set minute.

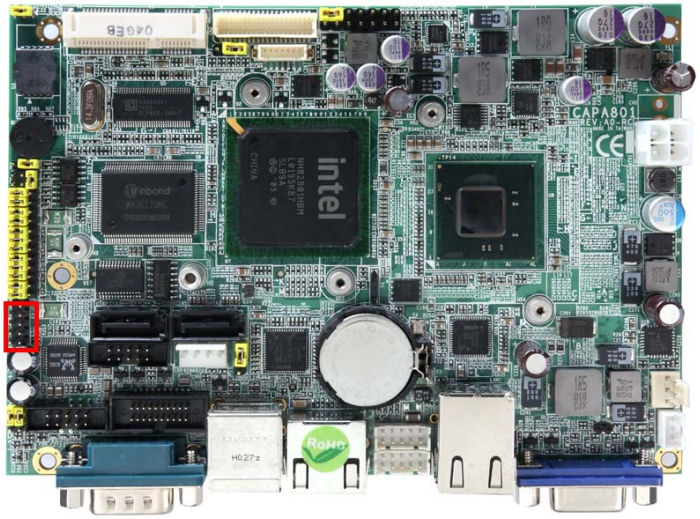
M = 00: Time-out Disable
01: Time-out occurs after 1 minute
02: Time-out occurs after 2 minutes
03: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes

- **Sample of Watchdog application**

Assume there is program A which needs to maintain running in a system. The value of Watchdog Timer must be set bigger than the running time of program A. Then, after the running time of program A is finished, either to disable or to reset watchdog timer.
When program A has problems to make system shut down, the system can be rebooted by Watchdog timer when the value of watchdog timer is countdowned to 0.
The below flowchart can be referred to edit program A.

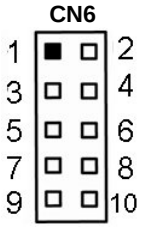


APPENDIX B
DIGITAL I/O



Pin	Signal	Pin	Signal
1	DIO 0 (Bit0)	2	DIO 3 (Bit3)
3	DIO 1 (Bit1)	4	DIO 4 (Bit4)
5	DIO 2 (Bit2)	6	DIO 5 (Bit5)
7	Ground (GND)	8	DIO 6 (Bit6)
9	Ground (GND)	10	DIO 7 (Bit7)

CN6



Digital I/O has 8bits (DIO0~7). Every bit can be programmed input or output and is set pull-high with +5V level (main power)as default.

BIOS default is 3 IN 5 OUT. The default set all of input and output pin to "1".

Digital I/O Software Programming

- **Digital Input/Output Assembler Sample Code**

```
;Start set DIO program:
    mov     dx,2Eh
    mov     al,87h      ;Un-lock super I/O
    out     dx,al
    out     dx,al

    mov     dx,2Eh
    mov     al,07h
    out     dx,al
    mov     dx,2Fh
    mov     al,08h
    out     dx,al

    mov     dx,2Eh
    mov     al,30h
    out     dx,al
    mov     dx,2Fh
    mov     al,02h
    out     dx,al

;Programming DIO as in/out.
    Mov     dx,2Eh
    Mov     al,0E0h
    out     dx,al
    mov     dx,2Fh
    mov     al,N        ;If N's value is 07h, DIO is programmed as input 3bits
    out     dx,al       ; and output 5bits(3in/5out). (Note1)
```

- **Digital Input**

```
;Read DIO digital input pins' value.
    mov     dx,2Eh
    mov     al,0E1h
    out     dx,al
```

```
mov     dx,2Fh   ; If N's value is 07h, Bit0 ~ Bit2 represent DIO0 ~ DIO2
in      dx, al    ;Bit0 ~ Bit2 are DIO0~2 state. (1 High, 0 Low, Note2)
```

- **Digital Output**

```
; Set DIO digital output pins' value.
mov     dx,2Eh
mov     al,0E1h
out     dx,al
mov     dx,2Fh
mov     al,M     ;If N's value is 07h, Bit3 ~ Bit7 represent DIO3 ~ DIO7,
out     dx,al    ;Set output value M
                 ;Bit 3 ~ Bit 7 are DIO Pin 3~7 state. (1 High , 0 Low)
                 ;When M is FF, all DIO pins are high.( Note3)
```

Note1:

The N has 8bits. Every bit's value is either "1" or "0".
" 1" means that the bit is programmed to input.
" 0" means that the bit is programmed to output.

Ex:

1. N=00h=00000000b

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Output	Output	Output

2. N=02h=00000010b.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Output	Input	Output

3. N=07h=00000111b.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Input	Input	Input

4. N=F2h=11110010b.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Input	Input	Input	Input	Output	Output	Input	Output

Note2:

IF N=07h.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Input	Intput	Intput

1. When DIO0~2 connect external device.
   The device sets DIO0~2 are high.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
1	1	1	1	1	1	1	1

2. When DIO0~2 connect external device.
   The device sets DIO0 is low and DIO1~2 are high.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
1	1	1	1	1	1	1	0

Note3:

IF N=07h.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Input	Intput	Intput

1. When M=FFh

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
1	1	1	1	1	1	1	1

2. When M=D7h

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
1	1	0	1	0	1	1	1